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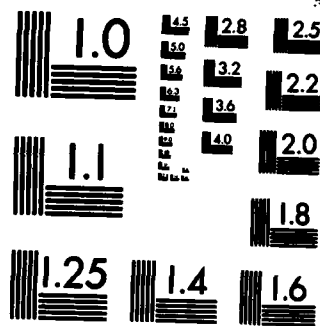
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# **A Pilot Study of the Impact of OMB Circular A-76 on Motor Vehicle Maintenance Cost and Quality in the U.S. Air Force**

Ross M. Stolzenberg, Sandra H. Berry

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OMB Circular A-76, which is designed to encourage use of private firms to provide services to the government whenever feasible, has had a major effect on the organization and management of U.S. Air Force vehicle maintenance. Through interviews and examination of administrative data for seven bases, the authors concluded that the limited available evidence suggests that application of A-76 leads to substantial cost savings with no clear effect on quality. Problems in implementing Circular A-76 are also discussed. *Key words:*

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# **A Pilot Study of the Impact of OMB Circular A-76 on Motor Vehicle Maintenance Cost and Quality in the U.S. Air Force**

Ross M. Stolzenberg, Sandra H. Berry

February 1985

Prepared for the  
Office of the Assistant Secretary of Defense/  
Manpower, Installations and Logistics

**Rand**

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## PREFACE

This report presents the results of a pilot study that examines the effects of the procedures mandated in Office of Management and Budget (OMB) Circular A-76 on the cost and quality of motor vehicle maintenance at Air Force bases. The study took place from March 1982 through March 1983. It attempted to answer certain questions about the policy that governs contracting out and performance work statement control for service functions needed by the government.

This work was conducted as part of the study program of Rand's Defense Manpower Research Center. It was sponsored by the Office of the Assistant Secretary of Defense (Manpower, Installations and Logistics) under Contract MDA903-83-C-0047.

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## SUMMARY

Since its initial release in March 1966, Circular A-76 of the U.S. Office of Management and Budget has evolved into a controversial instrument of change in the way that military agencies choose between in-house and commercial sources of support services, and in the way that these agencies manage the governmental and commercial organizations that provide these services. Proponents of Circular A-76 claim its virtues in reducing costs, whereas critics argue that A-76 lowers the quality of work performed. The research reported here is a pilot study that attempts to address these claims by examining the effects of A-76 procedures on the cost and quality of motor vehicle maintenance at Air Force bases.

Although Circular A-76 mandates many changes, its most fundamental features are:

- *Competitive, fixed-price bidding.* Government organizations and commercial contractors submit fixed-price bids for the right to perform services needed by the government. If the government bid is sufficiently low compared with bids from commercial sources, then the government organization supplies the service. Otherwise, the contract goes to the lowest-priced, capable commercial source. A government organization that loses an A-76 bid competition is dismantled, and its workers are either reassigned or laid off.
- *Performance work statement control.* Insofar as possible, contractors and government organizations operating under A-76 procedures are given a statement of work to be performed and are free to perform that work in any safe manner that is consistent with the demands of defense or government. The statement of work includes performance standards for specified tasks and financial penalties to be assessed contractors whose performance falls below those standards by a sufficient margin.

Although all bases are subject to the provisions of Circular A-76, not all bases have performed cost studies and changed their traditional procedures according to the results. Some bases are not required to perform cost studies because of their mission or for other reasons. We examined the cost and quality of vehicle maintenance at three bases where a cost study has taken place and a contractor performs the work, two bases at which cost studies resulted in civilian government

employees performing vehicle maintenance, and two bases where no cost study has been performed and government employees (or a mixture of civilian and uniformed Air Force personnel) maintain vehicles under traditional procedures. Thus we are studying both contracting and the application of performance work statements. Our findings are based on lengthy personal interviews with Air Force and contractor personnel, and on computer-generated motor vehicle management information system reports produced for normal administrative purposes at study sites. We attempted to answer four questions.

### **WHAT IS THE EFFECT OF A-76 ON THE COST OF VEHICLE MAINTENANCE?**

Interviews and limited administrative data available to us suggest that application of Circular A-76 leads to (1) very large reductions in the number of employees who devote their time to motor vehicle maintenance, and (2) substantial differences in the cost per mile of operating Air Force base administrative fleets. We found the lowest costs per mile of vehicle use at bases where maintenance was performed by government employees operating under the terms of Circular A-76.

### **WHAT IS THE EFFECT OF A-76 ON THE QUALITY OF VEHICLE MAINTENANCE?**

Interview data lead us to no simple conclusions about the effects of A-76 procedures on quality of motor vehicle maintenance. Some informants report excessive deferral of maintenance by contractors, whereas others report success in prodding contractors' timely response to deferred maintenance requirements. Air Force personnel report that contractors seek to do the absolute minimum of maintenance necessary. These same personnel report both the adequacy of vehicle-out-of-commission (VOC) rates achieved by contractors and that the performance of contractors can be measured by VOC rates.

Actual VOC rates for administrative vehicles show approximately equal performance of contractors operating under A-76 and traditional in-house operations. VOC levels were highest for the in-house operations managed under A-76 procedures. A limited statistical analysis indicates a strong inverse relationship between the VOC rate for administrative vehicles and the cost per mile for these vehicles. This finding suggests that larger maintenance expenditures buy higher

quality maintenance. However, fairly large increases in the costs per mile of vehicle operation appear to be required to produce only small improvements in the VOC rate. We have no statistical data that directly address the effects of A-76 procedures on military readiness.

### **WHY DO IN-HOUSE MAINTENANCE ORGANIZATIONS SO FREQUENTLY LOSE A-76 BID COMPETITIONS?**

We can provide no definitive answer to this question, although it seems that differences in personnel costs and lack of sophistication in preparing bids contribute to the government's poor showing. However, given the strong incentives to keep work in-house, we remain puzzled by the consistent pattern of losses.

### **WHAT PROBLEMS HAVE THERE BEEN WITH THE APPLICATION OF A-76 TO AIR FORCE VEHICLE MAINTENANCE?**

As is to be expected when any new procedure is adopted by an organization, application of A-76 procedures to Air Force motor vehicle maintenance has proceeded with certain difficulties. When a bid competition is won by the government rather than by a contractor, A-76 appears to function only as a mechanism for setting a budget ceiling. In practice, the in-house organization appears to be unable to refuse demands to perform tasks not in the work statement, and equally unable to obtain additional resources to pay for these additional tasks. At sites where contractors perform maintenance, the major sources of difficulty appear to result from ambiguity in and incompleteness of the statement of work, and from ambiguity and insufficient detail in the criteria and procedures for measuring contractor contract compliance. However, our informants indicate that significant progress in overcoming these problems is being made as old contracts expire and new contracts are written. But there appears to be no progress whatsoever toward full application of A-76 procedures at in-house maintenance operations.

This is a pilot study that should be followed by a larger, statistical analysis that provides more precise estimates of the effects of A-76 procedures.

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## I. INTRODUCTION

In March 1966, the U.S. Office of Management and Budget (OMB) promulgated Circular A-76, which prescribed "policies for acquiring commercial and industrial products and services needed by the Federal government." Through a series of revisions, Circular A-76 has evolved into an instrument for radical change in the way that military agencies choose between in-house and contracted-out sources of goods and services, and in the way that these agencies manage the governmental and nongovernmental organizations that provide those goods and services. Supporters of A-76 claim its virtues in reducing costs. Detractors claim its damaging effect on the quality of work performed. This document reports the findings of an exploratory study designed to shed light on some of those claims, to understand the ways in which A-76 procedures work in practice, and to seek ways in which A-76 can be made more effective. Our method here is to compare motor vehicle maintenance activities at seven Air Force bases, some of which have altered their management of vehicle maintenance as a result of A-76 and some of which operate under traditional procedures.

Our findings are based on examinations of administrative records and documents, and on confidential interviews with government employees, military personnel, and contractor employees at our seven sites and at other locations. Interviews with knowledgeable people and examination of administrative documents can be powerful instruments for gaining insight into the workings of complex bureaucratic procedures. But one must recognize that these insights lack the precision of information obtained from more time-consuming, elaborate, and expensive research efforts such as longitudinal surveys, controlled experiments, and even full-scale statistical reanalyses of existing data. One must also bear in mind that this research was completed during peacetime; neither our informants nor the data we examine can address directly a host of important questions about the effects of A-76 procedures on peacetime readiness and wartime sustainability of combat capability. Nonetheless, our research does provide information on the effects of A-76 procedures on peacetime functioning of motor vehicle maintenance organizations in the Air Force and, by inference, on the way in which A-76 procedures may affect other activities as well.

In the next section, we describe the specific procedures that come into play when A-76 is applied. We also discuss the evolution of these procedures through various modifications of A-76. Following our

description of A-76 and its history, we discuss the design of this study and the considerations that led to its selection. Finally, we discuss our findings in the last section of this report. This report attempts to answer four questions:

- What is the effect of A-76 procedures on the *cost* of motor vehicle maintenance at U.S. Air Force bases?
- What is the effect of A-76 on the *quality* of motor vehicle maintenance at these bases?
- Why do federal employees so frequently lose bid competitions for motor vehicle maintenance contracts at Air Force bases?
- What are some of the problems encountered during application of A-76 to motor vehicle maintenance in the Air Force? What could be done to avoid these problems in the future?

## II. CIRCULAR A-76 OF THE OFFICE OF MANAGEMENT AND BUDGET, AND RELATED REGULATIONS

Replete with rules, procedures, examples, and a formal statement of philosophy, Circular A-76 of the Office of Management and Budget is a major pronouncement of policy on the use of commercial sources for goods and services needed by federal government agencies. Together with documents that clarify and expand upon it, Circular A-76 dictates to military and civilian agencies

- When to seek commercial sources for goods and services
- How to decide among commercial and government sources that offer these goods and services
- Major terms of contracts under which these goods and services are to be provided
- Administrative procedures that are to govern federal employees who produce these goods or services in the event that commercial sources are considered but rejected.

Circular A-76 and the documents that implement and clarify it evolved from bulletins of the Bureau of the Budget in the late 1950s. Circular A-76 was first issued in March 1966, and revised versions appeared in 1967, 1977, 1979, and 1982. The 1979 and 1982 revisions incorporate major supplements that specify procedures for preparing statements of work to be performed and for comparing contractor bids with the cost of using federal employees to perform equivalent work.

From its earliest form to the present, the stated purposes of Circular A-76 have been to lower the cost of government and, secondarily, to increase government use of profit-seeking firms as sources of needed goods and services whenever appropriate. Circular A-76 specifies that profit-seeking firms are not appropriate sources of services that are "inherently governmental in nature" (Circular No. A-76, Revised, Transmittal Memorandum No.4, March 29, 1979). Inherently governmental services include law enforcement, judicial activities, conduct of foreign policy, national defense, regulatory activities, tax collection, and financial administration of government. Accordingly, procedures specified in A-76 do not apply to activities that provide such services. A-76 procedures are also waived for DoD procurement of research, development, tests, or evaluation (Circular A-76, Revised, Transmittal Memorandum No. 6, January 26, 1982). Thus, A-76 procedures have



not been applied to research and development activities by civilian or defense agencies.

A commercial or industrial activity performed by military personnel can be exempted from application of A-76 procedures to preserve combat support capability, to provide training to military personnel, or to provide military personnel with work assignments necessary for military career progression and rotation from overseas assignments. However, Circular A-76 specifically identifies depot and intermediate level maintenance activities and motor vehicle maintenance as suitable for performance by commercial contractors under A-76 procedures.

Application of A-76 procedures in military agencies follows a four step procedure: First, activities are identified as appropriate for performance by commercial sources. Second, each site where the activity is performed is examined to identify any special circumstances that would make commercial sources inappropriate there. Third, a cost study is made at each site where commercial performance of the task is appropriate. The cost study determines if it is more economical to perform the task in-house (by government employees) or to let a contract for its performance by a profit-seeking firm. And, fourth, the task is actually performed by a contractor or in-house staff under the rules specified in Circular A-76. The cost study is the most complex phase of the entire process; we now describe this critical step in more detail.

The cost study consists of several stages: (a) preparation of a detailed statement of work (SOW) to be performed, (b) estimation of the cost of using government employees to perform this work, (c) solicitation of fixed-price bids from commercial sources for performance of the work, and, finally, (d) selection of the lowest bid submitted by an organization deemed competent to perform the work. Each of these steps is described below.

### STATEMENT OF WORK (SOW)

A critical feature of contracting under the terms of Circular A-76, the SOW describes exactly what work is to be done, the standards to which the work must conform, and financial penalties, known as "deducts," to be charged if these performance standards are not satisfied. Insofar as possible, the SOW is meant to specify work only in terms of its outcome, rather than in terms of the procedures used to achieve that outcome. Organization, techniques, capital-labor trade-offs, and other procedural matters are specifically left to the discretion of organizations providing maintenance services, except when security, safety, or military requirements dictate how the tasks described in the

SOW must be performed. We refer to this type of management as performance work statement control (PWSC).

Quality standards described in the SOW specify both desired outcomes and acceptable levels of failure to achieve those outcomes. For example, a SOW for motor vehicle operations may specify that on-base taxi passengers are to be picked up within five minutes of their telephone request for service, but that this standard must be met only 90 percent of the time. Where feasible, the contractor is required to redo unsatisfactory work. For example, if a contractor does an unsatisfactory job of repairing a bent fender, he is required to reperform the repair properly, with no additional payment. Quality standards are designed to be objectively measurable, and quality control is part of the contractor's responsibility.

Although quality control is considered to be the contractor's responsibility, government employees called quality assurance evaluators (QAEs) conduct regular surveillance to assure contract compliance. Surveillance is specified in a surveillance plan, which is part of the contract. Surveillance is done by selecting examples of the contractor's work and examining their quality. Examples are selected by simple random sampling according to a table of random digits, and by methods that satisfy the administrative judgment of QAEs and their supervisors. If unsatisfactory work is discovered in examples selected by administrative judgment, the contractor is merely required to redo that work. If unsatisfactory work is discovered in examples selected by random sampling, more complex procedures come into play: Quality standards stated in the SOW specify an acceptable failure rate. If the percent of failures among randomly sampled examples exceeds this failure rate, a deduction is made from the government's payments to the contractor for services rendered. In other words, failure in a sufficient portion of the random sample is taken as evidence of failure in unsampled as well as sampled cases, and the deduction is based on the level of noncompliance inferred from the random sample. As in all contracts, gross failure in the contractor's performance can lead to dissolution of the contract in a court of law.

Two final points about the SOW bear mention: First, because SOWs are critical parts of A-76 contracts, and because writing SOWs is complex and time-consuming, the Air Force maintains prototype SOWs for a variety of different tasks, including motor vehicle operations and maintenance. These sample SOWs are updated periodically to incorporate wisdom acquired through experience with earlier versions of the SOW. The second point is that the role of the SOW in A-76 contracts has increased as Circular A-76 has evolved. In this research, we are concerned only with the current status of the SOW in

A-76 contracts, which is described in a January 1982 Supplement to Circular A-76.<sup>1</sup>

## **COST ESTIMATION AND BID COMPETITION**

Once the SOW is written, the government and potential contractors prepare competitive bids to perform tasks described in the SOW.<sup>2</sup> Contractors are free to propose organization plans, staffing levels, and other resources in the manner they believe most efficient. Contractors use whatever method they like to calculate overhead, wages, fringe benefits, profit, and other budget items. The contractor makes a firm fixed-price bid.

The cost of using a contractor is calculated by adding to his bid a surcharge for contract administration (originally four percent, later six percent in some cases), and one-time costs associated with severance pay, relocation, and retraining of employees likely to be terminated from government employment if the contractor replaces an existing in-house operation.

The cost of using the government to perform tasks described in the SOW is more complex to estimate than the cost of using a contractor. Normally, the government cost estimation process begins with a major review of management procedures and practices. Circular A-76 advises agencies to conduct internal management reviews prior to calculating cost, to ensure that the operation is organized and staffed for maximum efficiency in accordance with agency manpower and personnel regulations. Then, standard formulas are used to estimate retirement costs, insurance, workmen's compensation, and other employee benefits. Detailed instructions are also specified for calculating material, personnel, and overhead costs.<sup>3</sup> Sealed bids submitted by the potential contractors and the government are opened and costs compared. If contracting appears to be sufficiently less costly, a preaward survey is conducted to determine whether the lowest bidder is capable of performing the work. If so, the contract is awarded and the in-house operation is dismantled.

<sup>1</sup>A Guide for Writing and Administering Performance Statements of Work for Service Contracts, Office of Federal Procurement Policy Pamphlet No. 4, October 1980, designated as Supplement No. 2 to Circular A-76, Revised, Transmittal Memorandum No. 6, January 26, 1982.

<sup>2</sup>If no contractors bid, work goes directly to the government. If no government unit prepares a bid, a contractor is selected to perform the work.

<sup>3</sup>These are provided in the Cost Comparison Handbook, Supplement No. 1 to OMB Circular A-76; Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government, Executive Office of the President, Office of Management and Budget, March 1979.

The A-76 program provides some protection for functions that are being performed in-house at the time of the cost comparison. For example, an existing in-house activity is not converted to contract performance unless doing so produces savings of at least 10 percent of government personnel costs, plus 25 percent of the cost of ownership of equipment and facilities for the period of time covered in the bids. In addition, federal employees displaced as a result of conversion to contract performance are given the right of first refusal for employment openings generated by the contract. Agencies are required to assist displaced employees in finding new employment, including paying for retraining or relocation in some cases.

Once an activity is performed under contract, the cost differential requirement operates in favor of continued contracting. Prior to the expiration of a contract, agencies are required to determine whether it is likely that costs for government performance will be below contract cost by at least 10 percent of government personnel cost plus 25 percent of the cost of ownership of equipment and facilities. If these expected cost differentials do favor government performance, then a full cost comparison must be carried out. Subsequently, review must be repeated at least once every five years. Review procedures for work that remains in-house are specified in less detail: presumably, additional reviews must be undertaken within five years of the initial cost comparison.

This section has briefly outlined the key features of OMB Circular A-76, the related documents that supplement and clarify the circular, and the evolution of the procedures contained in these directives. Before going on, we summarize our overview: A-76 directs the federal government to use commercial sources of goods and services wherever appropriate and cost effective. Under A-76, a provider of goods or services is selected by fixed-price competitive bid. A-76 specifies procedures for the government to enter a bid. Insofar as possible, A-76 dictates results-oriented task performance—suppliers are to be as free as possible to select their own methods for performing the work described in the statement of work. The SOW includes performance standards for the tasks it describes. A-76 specifies surveillance of contractor performance to assure compliance with performance standards. Noncompliance is judged by random sampling methods, and noncompliance leads automatically to deductions from government payments to contractors.

### III. STUDY DESIGN

Design of this study proceeded in three stages. In the first stage, we explored the implementation of the A-76 program in all U.S. Armed Services and identified motor vehicle maintenance at U.S. Air Force bases as a study focus. In the second stage, we selected research sites from the universe of all Air Force bases in the United States. And in the third stage, we identified data to be obtained from these selected bases. We now describe the decisions made in each of these stages and the rationale behind them.

#### SELECTION OF AIR FORCE MOTOR VEHICLE MAINTENANCE

We thought it important distinguish the effects of A-76 procedures from the more general effects of organizational change that might be expected to accompany any new procedure. These effects of change could be liabilities or benefits. For example, change is often disruptive, and so newly implemented programs might be expected to suffer from growing pains that adversely affect their efficiency and effectiveness. However, classic studies in industrial sociology suggest that the mere act of participation in an experimental program can sometimes increase worker productivity. Widely believed to be a general phenomenon in all industrial research, this increase is the so-called "Hawthorne effect," and one might expect to find it in the first implementations of a program such as A-76. Therefore we sought an A-76 application that was well established, so that the benefits and liabilities of newness would have had time to dissipate. Since we understood from personnel in the Office of the Secretary of Defense and in the Air Force that the Air Force had more experience with A-76 than the other services, we focused our attention on A-76 implementation in the Air Force.

Additional considerations guided us once we selected the Air Force as the site of this study. We learned that arguments in favor of A-76 had been based on claims of its economy, whereas arguments against A-76 had been based on claims of its adverse impact on military readiness and quality of work performed. So we thought it important to focus this research on a function that would be important in both war and peace, consumed significant budgetary resources, and was widely used. Because the time frame of this study was brief, we also chose to

avoid the delays and uncertainty involved in obtaining access to classified data. We sought an activity in which the output was observable, amenable to evaluation by objective standards, and recorded in the same format at bases that had and had not implemented changes as a result of A-76 procedures. Finally, we sought a function in which cost and quality and quantity of output were recorded in computer-readable format, since our past experience suggested that computerized records are often more complete and more internally consistent than records kept solely on paper.<sup>1</sup>

Preliminary interviews with Air Force and DoD personnel indicated that Air Force motor vehicle maintenance came closest to satisfying our selection criteria. A-76 procedures were used widely, but not ubiquitously, to administer motor vehicle maintenance on Air Force bases in the continental United States. The Air Force had extensive experience contracting out vehicle maintenance services, and had applied A-76 procedures for this purpose for some years. Because functioning motor vehicles are necessary for the transportation of personnel and materiel, and for servicing of aircraft, motor vehicle maintenance appeared relevant to some of the concerns with war readiness voiced by critics of A-76. The ubiquity of motor vehicle fleets at military installations, and the substantial costs involved in maintaining those fleets, indicated that a study of the effects of A-76 procedures on motor vehicle maintenance would address cost-savings arguments adequately. Further, motor vehicle maintenance is specifically mentioned in Circular A-76 as an activity suitable for A-76 procedures, so there could be no doubt that we were concentrating on an activity appropriate for administration by A-76 procedures. And, finally, our initial studies indicated that the computerized motor vehicle maintenance data base was quite accurate, and composed of raw data and summary statistics that were designed to provide critical information about the condition of each base's vehicle fleet, the work performed to keep it in that condition, and the costs paid for the necessary parts and labor. So we focused this study on the effects of A-76 procedures on motor vehicle maintenance in the Air Force.

---

<sup>1</sup>This experience was obtained in organizational research in nonmilitary settings. Computerized data are often checked for internal consistency and for completeness at the time they are recorded. Although these checks are simple, fast, and economical on a computer, they are often time-consuming, slow, and expensive when done by hand.

## SELECTION OF RESEARCH SITES

Our basic strategy in this research was to compare motor vehicle maintenance at bases that have carried out cost studies under A-76 procedures with motor vehicle maintenance at bases that have not carried out cost studies under A-76 procedures. Because a wide variety of factors affects vehicle maintenance costs and quality, the validity of these comparisons depends on the extent to which effects of other influences on maintenance cost and quality are held constant. In pilot studies (such as this one), there are too few cases to use multivariate statistical methods to hold other things equal. The best alternative to multivariate analysis is to select sites that are as similar as possible in characteristics that might invalidate comparisons between research sites.

For site selection to be successful in reducing the effects of confounding factors, it must be possible to discern before selection whether these factors are present at a site. Therefore our site selection procedures were based on the factors that we were able to identify without investing the resources necessary to visit or otherwise contact bases. We first attempted to identify all major factors that might threaten the validity of comparisons between bases that had been modified by A-76 procedures and traditional motor vehicle maintenance organizations. Our sources of information about these factors were interviews with personnel responsible for contracting policy and vehicle maintenance policy, interviews with personnel responsible for implementation of these policies at Air Force bases, interviews with contractor employees, and Air Force publications of vehicle maintenance regulations (Air Force Manual 77-310, Vols. 2, 3, and 5). These sources suggested nine factors that are likely to affect cost and quality comparisons between bases. The first four factors (shown in Table 1) could be identified without actually contacting individual bases. We now discuss these four factors and the way that we entered them into our research design. We then discuss the five remaining factors.

To deal with the first confounding factor, *command*, we selected for this study bases operated by two commands that covered a variety of common vehicle requirements, such as support of flight lines, on-base transport, and off-base transport.

The second confounding factor, *contract/in-house status*, recognizes the twin, somewhat different functions of Circular A-76. On one hand, A-76 specifies rules for deciding when to use outside contractors rather than government employees. The empirical record shows that A-76 tends to replace government employees with contractors. So one might expect A-76 to affect motor vehicle maintenance solely through its

Table 1

**POSSIBLE CONFOUNDING FACTORS THAT COULD BE  
MEASURED PRIOR TO SURVEY OR VISIT OF BASES**

- 
- **Command.** Commands have different vehicle requirements, such as flight line support or on-base transportation.
  - **Contract/in-house status.** A-76 procedures can be applied to bases at which maintenance is contracted out and to bases where maintenance is performed in-house. Contract/in-house status may have effects independent of the application of A-76, for example, through the application of federal personnel policies on in-house A-76 bases, and the application of contractors' personnel policies on contracted A-76 bases.
  - **Base size.** Larger bases may enjoy economies of scale in monitoring contracts, operating vehicle fleets, and other activities related to vehicle maintenance.
  - **Weather.** Winter driving conditions require more preventive maintenance, increase the need for repairs, and make maintenance more difficult (for example, in winter, a vehicle may have to be stored indoors for several hours before it is warm enough to service; minor repairs and inspections which can be performed in a parking lot during warm weather may have to be done indoors).
- 

tendency to promote contracting. On the other hand, A-76 specifies performance work statement control (PWSC) procedures that are designed to affect the efficiency and effectiveness of task performance by both contractors and government employees. Identification of any impact of these procedures would seem to be critical to understanding the effects of A-76 on motor vehicle maintenance.

The research design depicted in Table 2 distinguishes between the effects of A-76's tendency to promote contracting and the effects of the PWSC procedures also specified in the circular. This design specifies that data are to be gathered on the four types of vehicle maintenance situations specified by the cells in the table. Comparisons within rows of the table indicate the effects of PWSC. Comparisons within columns indicate the effects of contracting out.<sup>2</sup>

During the design phase of this research, we were informed that there were only two Air Force bases in the continental United States that corresponded to cell "c" of our research design (i.e., motor vehicle

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<sup>2</sup>Given sufficient data, least-squares procedures could be used with this design to distinguish main effects of contracting and PWSC and interaction between them net of other factors (covariates).



Table 2

DESIGN FOR DISTINGUISHING BETWEEN EFFECTS OF  
CONTRACTING AND EFFECTS OF PERFORMANCE  
WORK STATEMENT CONTROL

Performance	Cost Study Performed and Performance Work Statement In Effect?	
	Yes	No
Contract	"a"	"b"
In-house	"c"	"d"

maintenance performed by government personnel following a cost study under the terms of OMB Circular A-76). Accordingly, we selected those two bases for study and sought two additional bases in each of the remaining three cells of the design. We selected those additional bases on the basis of the similarity of their size and weather conditions to the size and weather conditions of the two in-house A-76 bases. By using these matched sample procedures, we hoped to control for the confounding effects of weather and base size on vehicle maintenance cost and quality.<sup>3</sup> However, we were able to match base size only crudely. The final modification of this design came after our study was fielded, when our informants indicated that, in fact, there were no longer bases at which motor vehicle maintenance was contracted out under procedures other than those described in Circular A-76 (i.e., without performance work statement control). Based on this information, we eliminated from this study one of the bases originally believed to belong in cell "b," and retained the other as a third entry for cell "a," yielding a total of seven bases.

Table 3 lists five additional possible confounding factors that we could not measure before visiting the bases selected for study. Avoiding deleterious effects of these factors requires ability to measure both their variation across research sites and their impact on the cost and quality of motor vehicle maintenance at each of the bases included in

<sup>3</sup>Approximate weather matching was done on the basis of mean winter temperatures in the nearest location for which temperature data were reported in the 1981 Statistical Abstract of the United States. This resulted in at least one "warm" and one "cold" base in each cell. Size matching was done on the basis of the number of military and civilian personnel reported in *Air Force Magazine's Guide to USAF Bases at Home and Abroad*, 1981.

Table 3

POSSIBLE CONFOUNDING FACTORS THAT COULD NOT BE  
MEASURED PRIOR TO SURVEY OR VISIT OF BASES

- 
- **Vehicle use patterns.** Some vehicle fleets may be subjected to heavy use patterns, especially demanding road conditions, use by inexperienced or abusive drivers, or other use-related conditions affecting the amount of maintenance that must be performed to maintain the fleet.
  - **Vehicle mix.** Some vehicles require more maintenance, or more expensive maintenance, than others. For example, certain Air Force vehicles, such as airfield fire trucks, are manufactured in limited number especially for the Air Force and are extremely expensive to maintain.
  - **Age and condition of fleet.** Older vehicles tend to require repairs and preventive maintenance at more frequent intervals than more recently manufactured vehicles. Vehicles in poor condition because of age or other factors are more expensive to maintain and are out of commission more often than vehicles that are in good condition.
  - **Facilities and equipment.** The Air Force provides considerable equipment to contractors and to its own employees who perform vehicle maintenance. Base vehicle maintenance buildings differ in layout, lighting, heating, and other characteristics. Some bases have dynamometers, engine analysis devices, and other labor-saving diagnostic equipment that other bases lack.
  - **Civilian/military personnel mix.** Military personnel and civilian Air Force employees work according to different rules. For example, military mechanics are salaried and do not receive additional or premium pay for overtime work. However, military personnel are called away from their ordinary tasks periodically to participate in exercises and to perform other activities not required of civilians. Further, some military personnel assigned to vehicle maintenance activities are trainees who not only lack full certification to maintain the vehicles on which they work, but who consume the time of more experienced mechanics who guide them as they learn.
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this study. Because of our small number of sites, we can merely caution readers that these factors may have influenced our findings. We now describe the data and research methods used in this study, and then discuss our findings.

## DATA

Data used in this study are drawn from personal interviews and from administrative reports generated for normal management purposes at study sites. We describe personal interviews first, and then discuss data taken from administrative reports.

### Interviews

Interviewed personnel were promised anonymity and were interviewed for periods ranging from one-half to more than three hours. Interviewees were located at study sites, at command administrative offices, and at the Productivity Division of the Air Force Management Engineering Agency, which is responsible for writing the prototype statements of work that serve a fundamental role in procedures described in Circular A-76. Interviewees were selected on the basis of one or more of the following criteria:

- Their experience with motor vehicle maintenance at study sites, either as maintenance supervisors, administrators, quality assurance personnel, contractor employees, or motor vehicle data processing technicians;
- Their experience with A-76-type motor vehicle maintenance contract administration;
- Their knowledge of, and responsibility for, the motor vehicle maintenance policy of various Air Force commands;
- Their general knowledge of OMB Circular A-76 and experience with its application in the Air Force;
- Their request to speak with us about the purposes of the study, or to express opinions about the liabilities or benefits of procedures mandated by Circular A-76.

Interviews covered a broad range of topics. These topics included, but were not limited to:

- Characteristics of the base and its mission that affect motor vehicle use and maintenance
- Characteristics of the base motor vehicle fleet
- Organization of motor vehicle maintenance on the base
- Adequacy of physical plant and equipment for vehicle maintenance
- Experiences, if any, with cost study, bidding, and other A-76 procedures

- Experiences, if any, with contracting of motor vehicle maintenance under Circular A-76 and under other procedures
- Motor vehicle maintenance personnel at the base (civilian-military mix, skill level, Air Force experience, turnover, numbers of persons, etc.)
- How well the system runs, areas of notable success or failure
- Extent to which base commander, base resource manager, command level personnel, and commanders of resident units (e.g., commander of tenant TAC or SAC wing) involve themselves in motor vehicle maintenance and operations on the base
- Complaints of vehicle users
- Quality control and surveillance
- Relationship between contractor, if any, and base personnel; sensitivity of contractor to Air Force mission; contractor's view of base personnel and A-76 contracting for motor vehicle maintenance
- Procedures for entering vehicle use and cost data into computerized data base (Vehicle Integrated Management System), uses of these data, their accuracy and timeliness, and procedures for checking data

### **Administrative Report Data**

Data from administrative reports were taken from computer output generated by the Vehicle Integrated Management System (VIMS), or from its briefer version, Short VIMS (SVIMS).<sup>4</sup> VIMS and SVIMS are computerized information systems used on each Air Force base that maintains a motor vehicle fleet. These systems are composed of several databases and a set of computer programs for generating management reports on motor vehicles, their use, their cost of operation, their consumption of fuel and oil, the labor and parts required to maintain them, and the time use of mechanics responsible for their maintenance. Each time a vehicle is serviced or fueled, its VIMS or SVIMS database records are updated.

Data are entered into VIMS or SVIMS on computer cards by Air Force personnel or by contractor employees. Before entry, data are checked for accuracy. Once keypunched, data are checked by a computer program for consistency with previously entered SVIMS or

<sup>4</sup>For full descriptions of VIMS and SVIMS and their uses in Air Force motor vehicle management, see Air Force Manual 77-310, Vol. 2 (Motor Vehicle/Vehicle Management/Vehicle Maintenance Management), Vol. 3 (Motor Vehicle/Vehicle Integrated Management System/Users Manual), and Vol. 5 (Motor Vehicle/Short Vehicle Integrated Management System/Users Manual).

VIMS data. A listing of the previous day's entry errors is produced daily by the base computer. Errors must be corrected before data can enter the database. At one site, an informant reported that source documents "are checked four times before they get into the system." At sites where contractors maintain vehicles, quality assurance personnel monitor data input for accuracy.

Although managers certainly have incentive to manipulate the data, we found little evidence that this practice is common. Some informants report that consistency checking by SVIMS and VIMS programs makes data manipulation virtually impossible. Other informants state that they believe that manipulation may be possible, but they have neither direct nor indirect knowledge of deliberately erroneous data input by contractor or Air Force personnel. One informant reported that the contractor on his base attempted to treat decommissioned vehicles as vehicles in active use, to improve a key performance indicator for vehicle maintenance, the vehicle-out-of-commission rate for the fleet. But the informant stated that the attempt was quickly discovered by quality assurance personnel. Informants report that vehicle drivers often enter erroneous mileage data when they fuel their vehicles. But mileage data are checked by computer for consistency with previously entered mileage data, and mileage data are routinely audited when vehicles are inspected, repaired, or brought in for scheduled maintenance. So it does not appear that these errors produce more than minor variation around true mileage data. In summary, informants gave substantial reason to believe that SVIMS and VIMS data are generally accurate.

VIMS and SVIMS data are used in ways that suggest to us that (1) they are sufficiently accurate to be useful to people who work with motor vehicles on a daily basis, and (2) our informants would be aware of any systematic or pervasive inaccuracies in the VIMS and SVIMS databases. For example, VIMS and SVIMS data are used to generate reports that are used daily by contractors and Air Force personnel to plan scheduled maintenance and safety inspections, and to track fuel consumption, deferred maintenance, parts orders, and vehicle costs. Daily VIMS and SVIMS reports are used by contractor and Air Force maintenance supervisors to schedule work, and by quality assurance personnel to monitor work flow, parts orders, safety inspections, and the like. Monthly reports are used by base-level administrators to monitor vehicle maintenance and operations. The pervasive, heavy use of VIMS and SVIMS as a tool for managing day-to-day work suggests that these data are accurate—if they were not accurate, we think that they would not be used for these purposes, but would instead be little more than a required (and resented) procedural detail of Air Force life.

Comments by Air Force personnel support this view. For example, one informant said, "Our boys are so grateful to have a computer system for what we're doing." At another base, we were told, "We use VIMS quite a bit; the [quality assurance personnel] use it continuously." And one informant who complained about the management reports generated by VIMS stated that the data were accurate, and that he maintained a special library of programs to generate reports more to his liking from the VIMS database. In short, VIMS and SVIMS databases appear to be accurate accumulations of data that are highly relevant to motor vehicle maintenance activities on Air Force bases.

Although the VIMS and SVIMS databases are of great potential use for statistical study of motor vehicle maintenance, we were able to examine only management reports based on these data, generated for administrative purposes. (We were not able to obtain the actual data files or to specify our own data reporting requirements.) These management reports contain two variables of interest to us which were reported consistently by all the bases in the study—the vehicle-out-of-commission rate (VOC) and the cost per mile. VOC is the percentage of time that vehicles are out of commission for parts and labor (AFM 77-310, Vol. V, July 1981, pp. A3-11). Cost per mile is "the maintenance direct cost associated with each mile . . . a vehicle is driven" (AFM 77-310, Vol. V, July 1981, pp. A3-3). We use these variables in the next section, where we present our findings.

## IV. FINDINGS

Our discussion of findings is organized around four key questions that motivated this research:

- What is the effect of A-76 procedures on the *cost* of motor vehicle maintenance at U.S. Air Force bases?
- What is the effect of A-76 on the *quality* of motor vehicle maintenance at these bases?
- Why do federal employees so frequently lose bid competitions for motor vehicle maintenance contracts at Air Force bases?
- What are some of the problems encountered during application of A-76 to motor vehicle maintenance in the Air Force? What could be done to avoid these problems?

### WHAT IS THE EFFECT OF A-76 ON THE COST OF MOTOR VEHICLE MAINTENANCE?

Although Circular A-76 states a philosophical preference for using commercial sources whenever possible, it mandates cost minimization as the criterion for deciding whether government employees or private sector contractors should perform functions that are not intrinsically governmental in nature. So our first question about the application of Circular A-76 to Air Force motor vehicle maintenance is, Does it save money? We attempt to answer this question with longitudinal and cross-sectional data. Longitudinal data compare the cost of vehicle maintenance at the same site before and after implementation of A-76 procedures. Cross-sectional data compare the cost of motor vehicle maintenance at different sites at the same time. We begin with longitudinal data.

Longitudinal data were available to us only through interviews, and we were unable to locate persons at every site who could provide these data for us. Where available, these data suggest that A-76 leads to a drastic reduction in labor requirements with no apparent increase in the use of labor saving capital equipment. This reduction in labor appears to occur when (1) the A-76 bid competition is won by the in-house organization (i.e., government employees), (2) when the competition changes maintenance from an in-house operation to a contracted-out operation, or (3) when maintenance changes from a non-PWSC contract to PWSC-type contract. These labor reductions appear to be the major cause of savings associated with A-76 procedures.

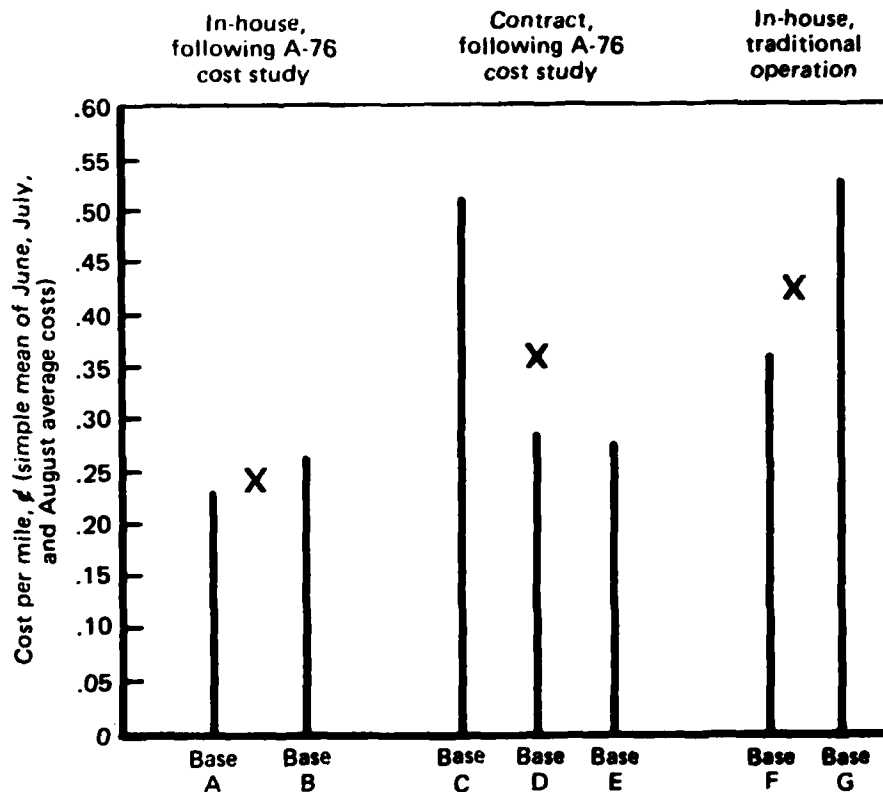
For example, when one base changed from a traditional in-house operation to an in-house operation following a cost study, four senior positions were consolidated into one and vehicle maintenance manpower was reduced to 58 percent of its former level. At another base that changed to a PWSC contract from an arrangement by which the contractor was paid according to a table of flat-rate charges for each task he performed, a work force of 35 mechanics was replaced by a work force of 12 mechanics. And though we lack longitudinal data for other bases, we note that Circular A-76 specifies that a contractor can replace an in-house operation only if the contractor's bid is low enough to provide at least a 10 percent saving over the in-house bid. Thus, even if the in-house organization does not bid below its prebid competition budget, the contractor who replaces that in-house operation under the terms of Circular A-76 is doing so at a cost saving of at least 10 percent. Persons we interviewed suggested that in-house organizations bid significantly below their traditional budget allocation, so that if a contractor wins the bid competition, vehicle maintenance costs normally drop substantially more than 10 percent below the pre-A-76 level.

Consistent with these results, interviews indicate widespread belief by federal employees that the government can win an A-76 bid competition only by severe cost cutting. Drastic cutbacks were believed necessary even if diligent care were taken to assure that contractors bid to perform the same tasks that are actually required of an in-house operation, and even if cost comparisons include full assessment of all costs of contracting out. "I'm surprised we didn't go contract," reported one informant whose in-house maintenance and operations organization successfully bid against contractors under A-76. He went on to say that if the contract had been limited to maintenance alone, he surely would have lost the competition.<sup>1</sup>

Whereas the limited, anecdotal data we obtained in interviews suggest dramatic cost advantages of A-76 procedures, cross-sectional VIMS data suggest systematic, though less extraordinary, cost effects of A-76 procedures. Figure 1 presents the average cost per mile of the administrative fleets at the bases in this study during June, July, and August 1982. Because winter driving conditions raise vehicle operating costs and these bases differ climatically, we give data from summer months only. Similarly, we use data on the administrative fleet only because these bases differ widely in the extent to which their total

<sup>1</sup>However, he said, a single contract was let for vehicle operations and management, and vehicle operations at his base had unusually stringent requirements which he believes discouraged several contractors from bidding, and frightened those who did bid, with consequent effect on their bids.





NOTES: Data for July at Base A deleted due to high probability of error.  
X indicates average cost per mile across bases in each category.

Fig. 1—Average cost per mile of administrative fleets, by base, for June, July, and August 1982

fleets include specialized, low-mileage, high-cost vehicles, such as air-field fire trucks and airplane loading vehicles. Each narrow, solid bar on Fig. 1 shows cost-per-mile data for a single base. Bases are grouped according to whether their vehicles are maintained in-house under PWSC, by a contractor under PWSC, or by a traditional in-house operation. The center of the "X" among each group of bars indicates the simple average of the cost-per-mile figures for the bases in the corresponding group.

Looking first only at the the X's on Fig. 1, notice that average cost figures are lower for the organizations operating according to the terms of OMB Circular A-76 than for organizations operating under other procedures. Looking next at the bars corresponding to individual bases, notice that four of the five bases operating under A-76 have

cost-per-mile figures that are lower than the cost-per-mile figures at either of the two in-house operations that do not operate under Circular A-76. Only one base operating under A-76, Base C, has a higher cost per mile than either of the non-A-76 bases. And although the cost per mile at Base C exceeds the cost per mile at one of the non-A-76 bases, the cost per mile at Base C is still lower than the cost per mile at the more expensive non-A-76 base.<sup>2</sup> These data are not a stringent test of hypotheses about the cost effects of A-76, but they are consistent with a claim that A-76 procedures lower the cost of motor vehicle maintenance.

Figure 1 also shows lower per-mile costs for in-house A-76 maintenance than for contract A-76 maintenance. This result suggests that competitive bidding, rather than contracting, may be the mechanism by which the procedures of Circular A-76 lower the cost of in-house maintenance.

We think that some restraint is required before concluding that A-76 uniformly and dramatically lowers the cost of motor vehicle maintenance. A number of issues concern us: First, although A-76 seems to lead to dramatic reductions in the number of personnel who maintain vehicles, we think that these reductions may overstate the total cost savings when A-76 leads to contracted-out maintenance. Even though A-76 cost comparison guidelines deal with contract administration costs in detail, it is possible that contracting involves administrative costs that were not included in the data available to us. These costs may be paid in the form of additional contract administrators or, when additional administrators are not hired, in the form of insufficiently administered contracts. At one base that had been experiencing unsatisfactory performance of vehicle maintenance by a contractor, Air Force personnel complained that there were insufficient personnel to properly administer A-76-type contracts. "When the Air Force developed 400-28 [i.e., the Air Force regulations implementing OMB Circular A-76],<sup>3</sup> they allowed for additional personnel [to administer the contract], but they never came across with the money for these people. It's killing the people in contracting to run these programs," said one informant. He went on to complain that contract administrators for the Air Force were working more hours than they were paid for, and were still having trouble keeping up with the paperwork requirements of A-76. However, even if these additional

<sup>2</sup>At the time of our visit Base C was receiving considerable attention from command headquarters for a number of problems with vehicle maintenance. This may explain the comparatively high cost figure.

<sup>3</sup>Department of the Air Force, *AF Regulation 400-28*, Vol. 1, *Base Level Service Contracts*, September 26, 1979.

requirements exist at many sites where A-76 is implemented, we do not believe that they do more than mildly offset the general pattern of labor reduction found in A-76 implementation.

We urge a second note of caution in viewing these cost comparison figures because they exclude, to an unknown degree, the fees paid to contractors for performing unanticipated services that are not included in the statement of work for the A-76-type contract. For example, an Air Force contract administrator complained that when extra services were required to support unusual or unexpected base activities, the contractor would supply these services only at "exorbitant" prices. An informant at another contract A-76 base made a similar complaint. If contractors do indeed overcharge for extra services, then we think that a full accounting of the costs of A-76 would have to subtract from savings on the cost of services included in the SOW those overcharges for extra services not included in the SOW. However, this cautionary note does not apply to cost comparisons between in-house organizations operating under PWSC and traditional in-house organizations.<sup>4</sup> At contract bases where it does apply, the volume of unanticipated, additional services is small compared with the total size of the maintenance contract. So fees paid for additional services do not seem to disturb our basic finding of large cost savings from A-76 implementation.

A third cautionary note concerns the time frame covered by the data available to us. These data allow examination of short-term costs only. Yet many vehicles are kept in use beyond the point where their age and/or condition satisfies Air Force criteria for their condemnation. For example, an informant at one base reported that 33 percent of his operating fleet was "over age or otherwise condemnable." When vehicles are "overused" like this, it *may* be appropriate to "overmaintain" them. But informants stated that the fixed-price structure of A-76 contracts is strong incentive for contractors to do the least amount of maintenance required: doing little costs less and takes less time than doing much. So it is possible that data covering a longer period of time would show different effects of A-76 procedures on the cost and quality of vehicle maintenance.<sup>5</sup>

<sup>4</sup>Later in this document we report that personnel who work at in-house A-76 maintenance organizations disclosed that they regularly perform tasks excluded from the A-76 work statement on which they bid, although they receive no additional resources to cover the costs of the additional tasks.

<sup>5</sup>Informants suggested that a contractor reaching the end of the contract period has an incentive to use the cheapest parts that will outlast his contractual responsibility, but that are not durable enough for the long period for which the Air Force keeps its vehicles. If these informants are correct, then contracting out may shorten the working lives of vehicles, and therefore raise the costs of vehicle ownership for the Air Force.

Having alerted readers to ambiguities and limitations of our findings about cost effects of A-76, we come to a brief summary: Interviews and limited administrative data available to us suggest that A-76 leads to (1) very large reductions in the number of employees on each base who devote their time to motor vehicle maintenance, and (2) substantial differences in the cost per mile of operating the administrative fleets of Air Force bases. We found the lowest costs per mile at bases at which maintenance was performed by government employees operating under the terms of Circular A-76. We now consider the effects of A-76 procedures on the quality of motor vehicle maintenance.

### **WHAT IS THE EFFECT OF A-76 ON THE QUALITY OF MOTOR VEHICLE MAINTENANCE?**

As in our consideration of the cost effects of A-76, we first present data from interviews, and then examine data from the VIMS computer system. In general, these data indicate that implementation of A-76 has brought problems in some cases, but the data do not support a claim that application of Circular A-76 to motor vehicle maintenance results in systematically inferior maintenance.

Interviews with personnel at two in-house PWSC maintenance operations suggest that major problems have been avoided, albeit narrowly in one case. Personnel at both sites report that their VOC (vehicle out of commission) rates are no higher under in-house forms of A-76 than under traditional in-house organization. An informant at one of these sites stated, "We are delivering about the same level of service [now as we did before we changed over to A-76 procedures]." That same informant also reported that runways on his base had never been closed because of fire truck maintenance problems in the years since vehicle maintenance there changed over to A-76. However, an official at the other base operating in-house under PWSC said, "We have a reasonable margin of success right now, but we are on the ragged edge of failing. . . . Our customers are compassionate to our problems." The transition to A-76 procedures has involved enormous cutbacks in the size of the vehicle maintenance labor force at this base, with consequent problems. But both the maintenance organization and vehicle users at the base appear to have adjusted to these circumstances, at least up until now and with difficulty.

At bases where contractors maintain vehicles, interviews suggest mixed reactions to effects of A-76 on the quality of vehicle maintenance. Several quality assurance personnel at bases operating under A-76 contracts reported that contractors have an incentive to do only

the bare minimum of maintenance, to keep their profits up and their VOC rate down. These informants claimed that contractors have short time horizons and therefore make decisions that are short-sighted and inefficient from the standpoint of the vehicles' owner, the Air Force. For example, several Air Force personnel state that contractors limit repair work to minimum solutions of immediately pressing problems, even when small increments in time and materials would lead to much more thorough and, in the end, more beneficial vehicle care.<sup>6</sup> Yet these same informants acknowledge the VOC rate as a valid indicator of vehicle condition and state that contractors generally keep the VOC rate within Air Force standards. At other bases, however, contractors appear to take the opposite approach to providing minimum maintenance. They attempt to monitor the condition of vehicles and anticipate maintenance requirements, rather than simply responding to service requests. Either of these approaches is valid under the terms of A-76, but it is not clear which is most effective in maintaining the fleet at least cost.

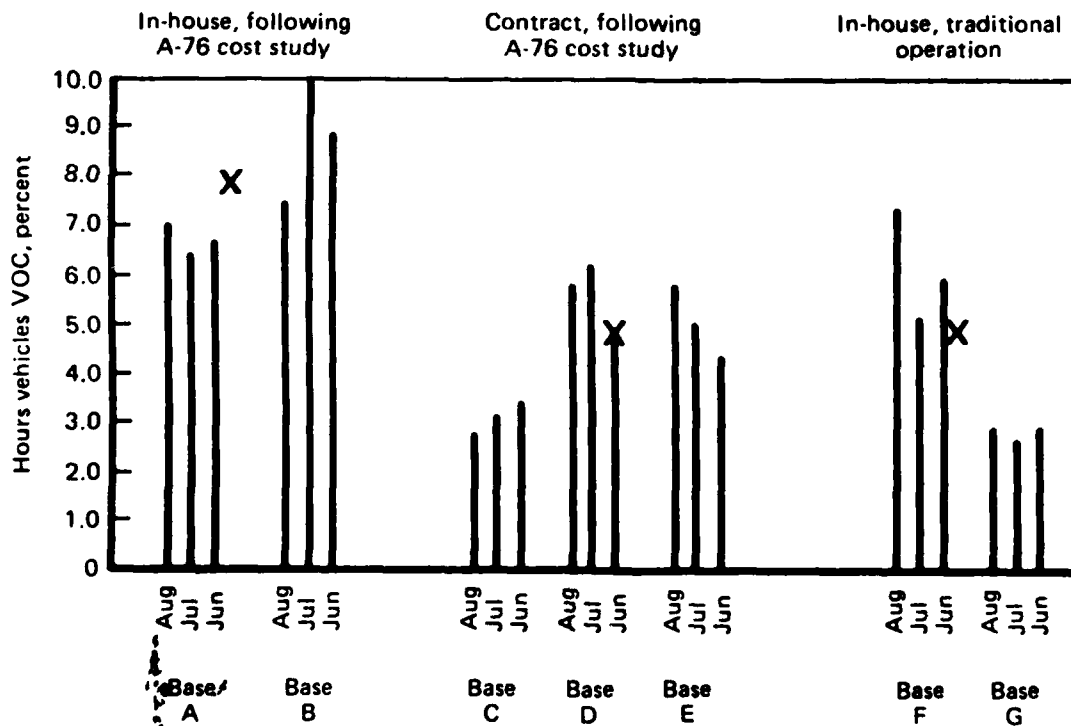
Using the VOC rate as a measure of quality is somewhat problematic, since the VOC rate may mask certain maintenance shortcomings. For example, deferred maintenance work is not included in the VOC rate. Personnel at one base reported having had difficulty with deferred maintenance accumulating to the point where the base could not fulfill some of its primary functions, even though VOC rates remained within acceptable bounds. However, a supervisor on that base stoically attributed these deferred maintenance problems to factors particular to Air Force and contractor personnel at his base, rather than to shortcomings of A-76. Consistent with this assessment, an informant at another base reported greater success in solving deferred maintenance problems. "About a year ago," he said, "we had a problem with deferred maintenance getting out of hand. So I exerted pressure on the QAEs," who in turn exerted pressure on the contractor until cooperation was forthcoming. Quality assurance evaluators at this base confirm their success in eliciting contractor responsiveness to their complaints about deferred maintenance accumulation.<sup>7</sup> So although our

<sup>6</sup>For example, if an engine is misfiring, finding the source of the problem involves most of the work needed to perform a complete tune-up. These informants complain that under A-76, a contractor has no incentive to finish the tune-up once the cause of the misfiring is located. We have no way of knowing if informants who disparaged contractors were expressing their own taste for thoroughness, if they were correct in their belief that it would be cost-effective to do more than the minimum amount of work required to put vehicles back in commission, or if their comments were merely self-serving.

<sup>7</sup>At a base with an A-76 contract vehicle maintenance organization, the QAE supervisor told us that service calls increased "about 75 percent in the first three months of the contract and has stayed there." However, it is impossible to know if the increase in service calls resulted from low quality of scheduled maintenance by this contractor, poor

informants reported that A-76-type contracts have involved maintenance quality deficiencies at certain sites, they report no consistent pattern of quality deficiencies as a result of A-76. Air Force personnel at some sites did, however, report more difficulty in achieving adequate levels of quality under A-76 than under other organizational regimes.

Information from VIMS management reports does not point to any systematic effects of A-76 on quality either. Figure 2 shows the percent of hours that general-purpose vehicles were out of commission during the months of June, July, and August at the seven bases in this study. As elsewhere in this report, we use summer data to minimize effects of climatic differences between bases, and we exclude data on highly specialized vehicles such as airfield fire trucks, which have specialized maintenance problems and which are present in large numbers at some bases and totally absent from others.



NOTE: X indicates average hours VOC across bases in each category.

Fig. 2—Percent of hours general-purpose vehicles are VOC, by base and month of 1982

quality of maintenance by the previous contractor during the last days of the previous contract, or greater responsiveness of this contractor to requests for service. Since that interview, the contractor has been replaced.

Looking at Fig. 2, notice that the VOC rate is approximately the same for contract PWSC and traditional in-house operations. In contrast, the VOC rate is somewhat higher at the in-house A-76 sites. Like the information obtained from interviews, these data do not support a claim of systematically higher VOC rates when A-76 leads to contractor-performed maintenance.

We think that the fairly high VOC rates for in-house maintenance under A-76 bears some scrutiny. Recall that we found that cost-per-mile figures were lowest at in-house A-76 sites. It seems natural to hypothesize that higher quality maintenance costs more to provide than lower quality maintenance, other things being equal, and that the low maintenance expenditures at in-house A-76 sites result in higher VOC rates at those sites. We address that hypothesis with Fig. 3, which combines the cost data arrayed in Fig. 1 with the quality data arrayed in Fig. 3. Each of the seven data points on Fig. 3 corresponds to one of the seven bases in this study. We have fitted a line to these points by the method of least squares. Although the small sample makes conclusions tentative at best, the negative slope of this line

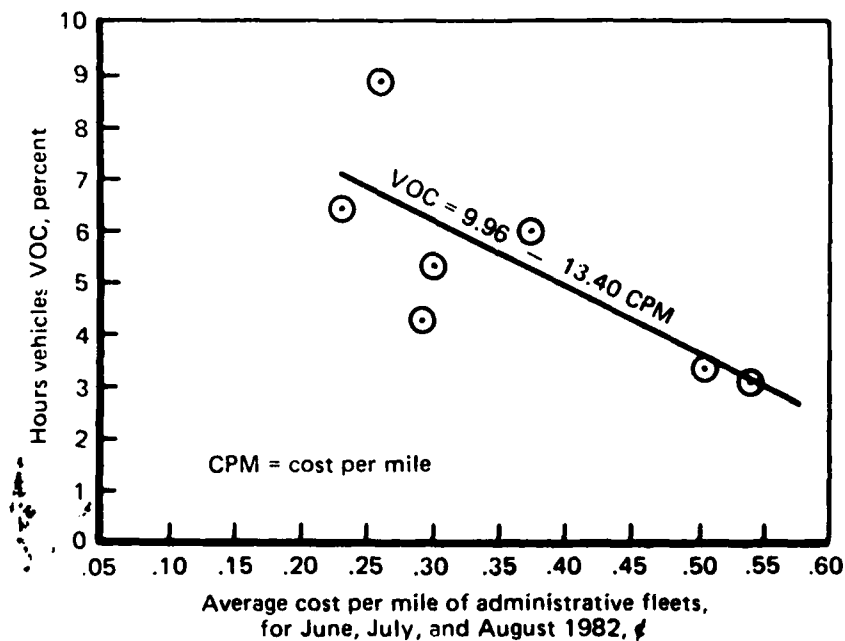


Fig. 3—Cost per mile versus VOC

indicates that higher per-mile costs are associated with lower VOC rates. Once again, we caution readers that a more complete analysis based on more sites and more numerous (and more relevant) variables might show different results than those we find here. But the VIMS data available to us suggest that the very low cost per mile at in-house A-76 sites is a benefit that is offset to some degree by somewhat lower quality of vehicle maintenance at those bases.

In concluding our observations about the effects of A-76 procedures on the quality of vehicle maintenance, it seems critical to observe that maintenance must, at some point, relate to the ability of the Air Force to wage war. Readiness for war and sustainability of fighting capability require vehicles that do the jobs required of them in wartime. We have seen no evidence that directly tests the effects of A-76 or contracting out on readiness or sustainability of combat capability. But we have listened to much discussion of this subject, and we have observed some facts which are relevant to it.

Several Air Force officers and civilian employees expressed the opinion that contracting out vehicle maintenance reduces ability to go to war. These informants objected to the high rates at which contractors replace each other, and to the fact that contractor employees cannot be temporarily assigned to distant locations, as can civilian government employees and uniformed military personnel, when the specialized equipment they maintain is shipped out to fight wars. We are impressed by the need to move mechanics along with specialized machinery that must work properly if battles are to be won, and we regret that we have not seen quantitative data that illuminate concerns about the effect of contractor maintenance on the availability of mechanics to repair specialized equipment at distant locations during war. However, we spoke to a number of persons who suggested that contractor maintenance is not as large a threat to sustainability of maintenance as it might seem. For example, we asked an Air Force officer, "Is it your gut-level reaction that contracting reduces war readiness?" He replied, "No," if the contractor went broke or otherwise disappeared suddenly, "I could probably cover operations myself."

Perhaps this informant was excessively optimistic in believing that he could cover operations with Air Force personnel after the sudden disappearance of a contractor. But it is not clear that contractors are inherently undependable, or that contracting therefore is inherently damaging to fighting capability. Civilian builders of complex equipment used by the U.S. Armed Services have provided a stable labor force of technicians who service these machines (e.g., computers). We see no reason to believe that private sector firms are intrinsically unable to do the same for cars, trucks, and building equipment, or for



airfield fire trucks, airplane loaders, fuelers, and similar specialized equipment.

There are, however, practical problems that may interfere with the successful maintenance of service vehicles by contractors. For example, some informants expressed concern about retention of mechanics who have the special skills needed to maintain special vehicles. Retaining mechanics who are trained to repair specialized Air Force equipment may be difficult, of course, but other informants report that the work force in contract operations tends to be stable, and that contractors change more often than the mechanics and technicians whom they employ. For example, one informant reported that a recent change from cost-plus contracting to A-76 contracting involved a change of contractors, "but the new contractor hired 95 percent of the people who were employed by the previous contractor." This informant reported that the contractor on his base tended to hire supervisors who are "retired E7's, E8's and E9's with strong Air Force commitment." At a base that had just changed from one A-76 contractor to another, informants reported that the new contractor hired the previous contractor's mechanics and made changes almost exclusively among supervisory level employees. And a contractor reported that he actively sought to hire former Air Force personnel with motor vehicle maintenance experience and offers enlisted men jobs in his organization when they leave the Air Force. These reports of a stable supply of Air Force war vehicle specialists seem to balance reports that contractors at several bases had experienced shortages of mechanics trained to work on Air Force fire trucks.<sup>8</sup>

To briefly summarize our findings about the effects of A-76 on quality of maintenance—interview data lead us to no simple conclusion about the effects of A-76 procedures on quality. Some informants report problems with deferred maintenance, while others report success in prodding contractors' timely response to deferred maintenance problems. Some Air Force personnel report with distaste that contractors seek to do the absolute minimum of maintenance necessary, but these same personnel report that VOC rates are adequate indicators of fleet maintenance, and that the performance of contractors can be measured by VOC rates. Actual VOC rates for administrative vehicles (from VIMS system reports) disclose approximately equal performance for traditional in-house and contract A-76 maintenance organizations, but higher VOC levels (i.e., lower quality levels) for in-house A-76 operations. A simple least-squares analysis indicates a strong inverse

<sup>8</sup>Continuity of staffing when a base changes from an in-house operation to a contractor is provided under the terms of A-76: Government employees must be given the right of first refusal for jobs on the new contract.

statistical relationship between the VOC rate for administrative vehicles and the cost per mile for these vehicles. This finding is consistent with the hypothesis that larger maintenance expenditures buy higher quality maintenance, and that smaller expenditures buy lower quality maintenance. However, fairly small improvements in the VOC rate appear to be bought with rather large increases in the cost per mile of vehicle operation. We have no data that directly address the effects of A-76 procedures on military readiness, but we believe that it is an important issue in need of attention. We found evidence that skilled personnel who were acquainted with Air Force procedures and specialized Air Force equipment may turn over less frequently than contractors, as incoming contractors were reported to make personnel changes primarily at the management level and to hire the labor of the departing contractor.

#### **WHY DO IN-HOUSE MAINTENANCE ORGANIZATIONS SO FREQUENTLY LOSE A-76 BID COMPETITIONS?**

According to information supplied to us, the Air Force has carried out cost studies for motor vehicle maintenance under A-76 procedures at more than 60 bases in the continental United States; at all but two of these bases, bid competitions between government maintenance organizations and civilian contractors have been won by contractors. Our interviews with uniformed and civilian Air Force personnel suggest that bid competitions are not lost for lack of Air Force motivation to keep motor vehicle maintenance in-house. These personnel expressed a very strong desire to keep motor vehicle maintenance in-house, largely, they said, because they fear that reliance upon contractors for essential services reduces Air Force ability to respond to the exigencies of war as well as to day-to-day demands that have been overlooked in drafting the SOW. Further, federal civilian employees who work in maintenance have a strong personal incentive to win the bid competition: If maintenance is contracted out, these workers may lose their jobs.<sup>9</sup>

Our informants suggested several reasons why the government tends to lose A-76 bid competitions for vehicle maintenance services. One is the inability of federal agencies to pay wages and benefits as low as

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<sup>9</sup>Federal government jobs have characteristics that make their loss seem unusually severe. Federal workers receive a wide array of benefits and job rights that are linked to job tenure, and that accumulate over time. For example, nonvested pension benefits, continued participation in the federal pension plan, extended vacations, and seniority rights may all be lost when an individual with job tenure terminates federal employment.

those paid by contractors. Informants emphasized the greater generosity of government benefits as a particular problem. These benefits include sick leave, vacation, and military reserve duty leave. One informant complained that veterans (who are given hiring preference by the government) start work with the benefits of long-time employees, and so virtually all of them qualify for 20 days of annual leave very early in their government careers. Many veterans serve in military reserves and are given 10 days of additional leave, with pay. Contractors do not give comparable vacations or leave, nor do they offer comparable pensions. The cost of higher federal benefits is said to make the government noncompetitive with civilian contractors.

Informants also complained that federal government personnel practices put the government at a disadvantage in bidding against contractors. "We could beat contractors [on price] if we could fire, and if we could hire tomorrow someone I need tomorrow. . . . Because hiring takes so long, we are always trying to hire, [just] in case we need someone soon." Explaining why he does not attempt to fire a long-term government employee who has done poor work in an important position, a supervisor at an in-service base reported, "It would take about five years to replace [him], and it would take 50 percent of my time." Ironically, the person whom this supervisor wished to fire also complained about the high cost of not being able to fire superfluous or low-quality workers; he cited as an example an employee who could not be fired even though his trade was no longer used on the base, leaving no work for him to do.

We were also told that Air Force operating procedures put in-house operations at a disadvantage in bid competitions. Air Force restrictions on scheduling of repair work were said to be a serious problem. Said an informant at an in-house PWSC organization, "I'm a little like Rodney Dangerfield: I don't get respect. When something breaks, I have to fix it right away. When your car breaks, you make an appointment for the next day and bring it in when the dealer says." Contractors operate like car dealers, this informant said, by being able to schedule appointments with vehicle users for repairs. Being able to schedule his work load allows the contractor to organize his workers efficiently, and so, says this informant, contractors can maintain a fleet with fewer mechanics than can a government organization charged with the same task. However, we are skeptical that contractors have greater freedom to schedule repair work than do government employees; except for deferred maintenance, scheduling of repair work is a violation of the SOW followed by contractors and government employees alike. We are aware of no reasons why contractors are more able or more motivated than government employees to violate this requirement.

The lack of government experience with bidding also appears to contribute to the high rate at which the government loses A-76 bid competitions. For example, at two bases we were told that government employees often do poorly in bidding because they tend to bid on the task of maintenance as they have always done it, whereas contractors bid on the task as it is described in the SOW. The task described in the SOW generally requires less work than government employees understand to be customary for vehicle fleet maintenance. As a result, government employees bid to do more work than do contractors, at a consequently higher price than the contractors bid. At one base, an informant estimated that the SOW covered only "80 to 85 percent of the base demands for vehicle maintenance." One informant who works in an in-house A-76 organization reported that his organization won its bid competition by making sure that the cost study reflected the full range of costs involved in changing over to a contracted operation, and because "our statement of work went deeper than most." In addition, it is difficult for government managers to drastically rethink the staffing requirements they have been using for years. In many cases this will mean loss of jobs for highly valued employees. Finally, although the designers of performance work statements talk in terms of "throwing away the rule book" when preparing bids, long-time government employees are skeptical that this can be done with impunity.

But, in general, we are perplexed by the poor record of government maintenance organizations in A-76 bid competitions. Certainly, expensive benefits and rigid personnel practices are disadvantages for the government. But contractors have expenses that government organizations lack. For example, contractors must add profit margins to their costs. Since Circular A-76 specifies fixed-price contracts, contractors must add allowances for unexpected contingencies. In the event of bad luck or simple oversight, failure to include a margin for unexpected contingencies could turn a fixed-price contract into a very unprofitable experience for a contractor. One contractor said he had "nightmares about fire trucks breaking down." In contrast, a government organization can neither lose money nor go bankrupt if it mistakenly bids too low on a service contract. Indeed, if government organizations were ruthless in their bidding strategy, we think they could adopt effective bidding tactics that would be suicidal for contractors: Because in-house maintenance organizations cannot lose money or go bankrupt, they could win bid competitions simply by bidding low, even unrealistically low. Some government employees would lose their jobs if a low bid were submitted and accepted, but many (or perhaps all) employees in the government organization stand to lose their jobs if a contractor

underbids the government. The work lives of government employees undoubtedly would be less pleasant if their organization's budget were slashed severely, but this unpleasantness must be balanced against the distress of job loss. Therefore, even if government wages, benefits, and practices are more expensive than those of contractors, and even if the government does not usually adopt a ruthless bidding strategy, we think it peculiar that government has not underbid private contractors more frequently in A-76 bid competitions.<sup>10</sup>

To summarize: We have asked why the government has been so unsuccessful in bidding against contractors to supply motor vehicle maintenance services under the terms of OMB Circular A-76. We are perplexed by the low success rate. Both Air Force officers and civilian Air Force employees report strong motivation to keep vehicle maintenance in-house. Contractors are able to avoid certain expenses that must be borne by an in-house operation, but in-house operations are able to avoid certain expenses that must be borne by contractors.

#### **WHAT PROBLEMS HAVE THERE BEEN WITH APPLICATION OF CIRCULAR A-76 TO AIR FORCE MOTOR VEHICLE MAINTENANCE?**

Organizational change virtually always proceeds by trial and error. Change of the type required by OMB Circular A-76 is no exception to this rule, and our informants have given us numerous descriptions of the trials and errors that have accompanied implementation of A-76 in Air Force motor vehicle maintenance organizations. The descriptions we retell here are not a complete catalogue of all the things that have gone awry in implementing A-76, but are remediable problems or problems that we feel pose serious threats to the performance of motor vehicle maintenance or to realization of the goals of Circular A-76. We believe attention to these subjects will be useful, both in evaluating the

<sup>10</sup>We were told that one base did follow the "low ball" strategy to keep its motor vehicle maintenance operation in-house. Said one informant, "This base was so afraid of contracting out that we bid to keep this operation in-house at all costs." Another informant stated "the contract was kept in-house only by cutting too deeply." Another informant suggested that the government has fared so poorly in bidding against contractors because government employees have not, until very recently, "really believed that it could happen to them," i.e., that they could lose their jobs if they bid too high. Seeing little chance of job loss, they have tended to bid high. It also is possible that the government's poor bidding results from inadequate communication between contracting, motor vehicle maintenance, and vehicle users. It may be true that users do not understand the consequences of a high bid, and that they pressure government to base its bid on a larger work force than a contractor is likely to use. Successful government bids appeared to result from active collaboration between contracting, motor vehicle maintenance, and vehicle user personnel.

effects of A-76 on motor vehicle maintenance and in making future implementations of A-76 proceed more smoothly. We first consider problems that have occurred at in-house A-76 operations, then consider problems at sites where contractors maintain vehicles under the terms of A-76-type contracts.

### **Problems at In-house A-76 Sites**

When government employees win an A-76 bid competition for motor vehicle maintenance in the Air Force, they report that the terms of Circular A-76 are selectively enforced, which causes substantial strain on the in-house organization and on the individuals who manage it. In the in-house operation, budget provisions of A-76 are reported to be enforced only in setting an upper limit on funding for vehicle maintenance, and the statement of work is reported to define only a subset of the total workload expected of the in-house operation. Contractors need not perform tasks omitted from the statement of work. If requested to perform additional duties, the contractor can refuse, or can state an additional fee for doing them. In contrast, several informants reported that an in-house operation must perform tasks not included in the SOW and it cannot expect to receive additional resources with which to perform them. Indeed, informants at an in-house A-76 operation report that their resources have been reduced below the level of their bid, while their work load has been increased above that specified in the work statement. An informant complained that a contractor would not have to pay any attention whatsoever to customer demands that were inconsistent with the SOW. He went on to say, "This week I worked from 6:00 AM to 5:00 PM [daily] because I was asked to do an additional piece of work [that was not included in the SOW]"; a contractor would not put up with this, he said.

Not surprisingly, the criteria for evaluating performance of in-house maintenance organizations appear to diverge from A-76 procedures at in-house A-76 sites. Whereas there are specific, measurable criteria for the success of an A-76 contractor, the criterion for measuring quality of maintenance at an in-house operation is reported to be the satisfaction of one's customers. An informant at an in-house A-76 base stated that VOC rates were defined for 15 separate classes of vehicles, but customer demands, rather than VOC rates, drive the behavior of the maintenance organization. Management of in-house organizations appears to place high priority on learning and responding to the demands of vehicle users. Management of contract A-76 organizations appears to be more directed at satisfaction of the specific terms of the SOW, a task that appears to be much easier than satisfaction of vehicle users. At a

contract A-76 site, an informant stated that quality of work at a contractor operation is measured by compliance with the SOW, and that customer satisfaction mattered little.

Some in-house personnel stated that their careers would suffer if they attempted to limit their work to tasks defined in the SOW. Yet another complained that there was little freedom to reduce performance standards for some aspects of the SOW in order to accommodate additional tasks or to raise standards on other aspects of the work statement. This informant complained that "The big fear is that we might deviate from the statement of work, or what we said we'd do, and then have some contractor [who bid unsuccessfully for the work] bring suit [that the bid competition winner was allowed to supply a cheaper product than was described in the bid solicitation]."

In summary, it appears that Circular A-76 has not been implemented fully in Air Force motor vehicle maintenance organizations where work has remained in-house. The most straightforward steps to take to implement A-76 at these sites would be to give these organizations (1) the right to limit motor vehicle maintenance to the tasks and performance criteria described in the statement of work on which they bid and (2) all the resources specified in their winning bid.

### Problems at Contract-A-76 Sites

**Definition of VOC rates.** Ambiguities in the meaning of VOC rates cause much difficulty. For example, deferred maintenance is excluded from VOC calculations and provides the contractor with an escape hatch. "We are having tremendous problems with deferred maintenance. There was no limit placed on deferred maintenance, so maintenance is deferred to keep VOC low. The new 400-28 [A-76] contract will place limits on deferred maintenance." Because they are averages, VOC rates can also cause difficulty by "burying" a small number of serious problems among a large number of nonproblem cases. For example, vehicles of a certain type can be out of commission often enough to cause operational difficulties on a base, but the VOC rate will not rise sharply if it is computed for broad categories of vehicles, most of which have low VOC rates. Airfield fire trucks are an extreme example of this situation—runways are closed if sufficient fire trucks are not in good working order. But problems can occur with garbage trucks, buses, or other types of vehicles that are not specifically identified in contracts. At one base, the chief of quality assurance told us that under the first A-76 contract at his base, the statement of work was "too tight in some places, too loose in other places," and grouped vehicles too broadly.

**Ambiguous SOW.** Considerable difficulties have arisen from ambiguities in the SOW. One informant indicated that the contractor and the Air Force differ over whether airport shuttle service is included as a deliverable in the statement of work at one base; the issue has gone to federal court for resolution. A quality assurance evaluator at this contract A-76 base said, "We follow the book as much as we can understand it; if we have a problem, then we go back to the contracting office." At another contract A-76 base, we were told, "There's a difference of opinion on-base over the meaning of the contract. On-base legal services have not been useful in resolving questions; they don't have detailed knowledge of contracting or of this contract. We go to [the command level] more than the on-base J.A.G. [Judge Adjutant General]. . . . The statement of work lacks definition and leaves people in the field floundering." Further, this informant said, "We are getting conflicting guidance on whether or not the contractor can be held financially accountable for requirements not described in the deduct system." However, at another base with contract A-76 maintenance, the contract administrator reported to us that problems with the contractor are taken to the base legal department for advice on how to enforce contract provisions. Clearly, some ready access to A-76 contract expertise is needed, and should be provided where it does not now exist.

**Incomplete SOW.** One informant stated that at his base the A-76 system is now working well in areas covered by the contract. In areas where the SOW has little to say, however, there are problems. The root of these problems appears to be contractor willingness to exploit SOW shortcomings by refusing to do more work than is contractually required, or by charging very high prices to perform work not originally included in the SOW. This problem appears likely to remedy itself as old contracts expire and new contracts are written to include items overlooked in early SOWs.

**Crudeness of Random Sampling Techniques.** Random sampling is a critical step in the process of taking deductions from contractors' fees for improperly performed work. A quality assurance worker at a contract-A-76 base complained that very complex and expensive work often was not sampled, while cheap, simple, and inexpensive tasks were included in the random sample. "We don't actually think that it's a big enough sample," he said. Similar feelings were expressed at another base where the quality assurance supervisor stated, "it is frustrating to see things that could or should be done better, but that are not sampled." In fact, poorly done work must be corrected whether or not it appears in the random sample, although it cannot be used in calculations of contractor liability for deductions unless it is randomly



sampled. The problem of large, expensive, or complex tasks escaping from the sample could be solved by stratifying the sampling on the basis of task complexity, importance, or expense, without necessarily increasing the sample size.<sup>11</sup>

**Handling of Complaints and Other Feedback from Vehicle Users.** At one contract A-76 base where contractor service was described favorably, quality assurance personnel report receiving only one written complaint about contractor service in the last seven months. Standard operating procedure at this base is for complaints to be made initially to the contractor. The quality assurance personnel reported that customers are hesitant to write complaints, partly because they fear that the contractor will give poor service in the future to those who complain. At other bases, failure of customers to complain about poor maintenance is believed to have allowed the contractor to continue to perform poorly, and has made it difficult for the Air Force to document and penalize poor performance. Said one informant in remarks echoed by an informant at another contract base, "People don't know what an adequate customer complaint system is." Further, said this informant, the Inspector General has objected that vehicle users dissatisfied with maintenance at this base complained directly to the contractor, who responded directly to them, bypassing quality assurance and contract administration personnel altogether. "A lot of our customers are not aware of the levers they have. They aren't complaining in a way that puts pressure on the contractor." "Last November, we started to educate users that the contractor could be pressured only if [poor service were] documented through complaints [to quality assurance personnel]; now we're getting six to ten complaints per month." These informants' comments lead us to think that systematic collection of customer satisfaction data probably would be a useful part of quality assurance. Perhaps this could be done by leaving a customer evaluation form on the seat of each vehicle as it is returned from the maintenance shop.

**Providing Enough Experienced Quality Assurance Inspectors.** Quality assurance inspection (surveillance) is critical to the success of A-76-type contract administration. Obtaining qualified quality assurance personnel was reported to be a serious problem at one base, although it was reported not to be a problem elsewhere. At the base where it was a problem, a supervisor complained that if a quality assurance worker fails to pass the qualifying test for his job, he cannot perform quality assurance work, but he cannot be fired either, which is

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<sup>11</sup>It may be useful to base deductions on two samples, one drawn without stratification before task performance, and one drawn with stratification after the task is complete and its complexity and cost are known.

both wasteful and crippling to the base's efforts to monitor the contractor. Further, this informant stated that when the federal government lays off workers due to reductions in force, quality assurance evaluators are subject to "bumping" by workers who have more tenure, though not necessarily sufficient aptitude or training for quality assurance work. At another base, the supervisor of quality assurance stated, "I don't really feel that I'm qualified for this job." He went on to complain that training of quality assurance evaluators is not adequate. However, this man's supervisor spoke highly of the training course for quality assurance workers and stated that on his base these personnel are well-trained. Quality assurance personnel, command personnel, and contract administrators at several other bases praised the quality of the Air Force's quality assurance evaluator training program. We think that provision of adequate numbers of fully qualified quality assurance personnel should take the highest priority in contracted A-76 motor vehicle maintenance. The success of contract performance under A-76-type contracts depends fundamentally upon the surveillance provided by these individuals.

Finally, we summarize our findings about problems in applying A-76 procedures to motor vehicle maintenance on continental U.S. Air Force bases. When the bid competition is won by the government rather than by a contractor, A-76 appears to function only as a mechanism for setting a budget ceiling. In practice, the in-house organization appears to be unable to refuse demands to perform tasks not in the SOW on which it bid, and equally unable to obtain additional resources with which to pay for these additional tasks. Indeed, we were told that resource levels have been cut from the bid level while work loads have been increased. At sites where contractors perform maintenance, the major sources of difficulty appear to result from ambiguity in and incompleteness of the statement of work, and in the criteria and procedures for measuring contractor contract compliance. Our informants indicate that as contracts have come up for renewal, significant progress has been made already in overcoming these problems at contract bases. There appears to be little progress toward full application of A-76 procedures at in-house maintenance operations.

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